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AUTHOR Shaver, James P.
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ABSTRACT

To test the long-range effectiveness of its ESEA Title III-sponsored program, officials of the Logan-Cache County Tutorial Center tested students served by the program 1 and 2 years after participation. The students, originally identified as underachievers, had been tutored in one-to-one or one-to-three tutoring situations or had been part of a control group. At the end of 1 year, tutorial students had increased significantly in reading ability. Students in grades 4, 7, and 10 were studied for 2 years after they entered the program, using the Sequential Tests of Educational Progress reading and writing tests. The results of statistical analysis of the findings showed that while tutorial students were still significantly better than controls, the seventh and tenth graders retained more than did fourth graders and, as with original testing, no difference was noted between the two types of tutorial situations. It was concluded that tutoring was valuable in any of its forms and should be continued. Tables are included. (MS)

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TUTORIAL STUDENTS TWO YEARS LATER: A REPORT ON THE LOGAN-CACHE TUTORIAL CENTER FOR UNDERACHIEVING READERS AND WRITERS

James P. Shaver

The Logan-Cache County Tutorial Center was established under Title III of the Elementary and Secondary Education Act in 1966. Its major purpose has been to provide tutoring assistance to students who are underachievers (that is, not performing up to their potential) in reading and/or writing.

The identification of underachieving students has been accomplished by using scholastic ability, as estimated by the California Test of Mental Maturity (the CTMM), as the estimate of potential performance. The reading and writing tests of the Sequential Tests of Educational Progress (the STEP Tests) were used to measure the students' present reading and writing performance. These three tests were administered to students and the correlations between CTMM scores and scores on the STEP reading and writing tests calculated at the Utah State University Computer Center. With the students' scores on the CTMM as the criterion, the overall correlations between CTMM scores and scores on the two STEP tests were used to predict how well each student should be doing on the STEP tests. When a student's score on a STEP test was below that score predicted for him on the basis of his CTMM score, he was considered to be an underachiever. In other words, students who were not reading or writing up to the level that would be expected according to an estimate of their scholastic ability (the CTMM) were considered to be underachievers.

The testing program to identify underachievers was carried out at three grade levels in the two cooperating districts: the third grade in Cache County, and the sixth and ninth grades in the Logan City School District.

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Tests were administered in the spring to identify students to participate in the program during the next school year as fourth, seventh, and tenth graders.* At each grade level, those students with the greatest negative discrepancies between their actual and predicted reading and writing scores were selected to participate in the program. Using random procedures to insure that each student had an equal chance of being assigned to each group, those students selected to participate were assigned to one-to-one (1-to-1) tutoring (one tutor and one student), one-to-three (1-to-3) tutoring (one tutor and three students), or to a control group. This last group of students was set up to allow careful assessment of the effects of tutoring. The control students, unknown to anyone except the project director, remained in their regular classes and received no special help. They provided a baseline against which the gains of the tutored students could be compared.

Assessment of Learning

Careful assessment of learning has been considered of the utmost importance for evaluating the effects of the Tutorial Center. At the end of the first year of the project, the STEP reading and writing tests were readministered to the tutorial and the control students. Arithmetic averages (means) were computed for the various groups and compared to determine if tutoring had had an effect. Analysis of covariance was used to analyze group

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*Further information about the Center--its objectives and procedures--is available from the Center office in Logan. A booklet describing the project (Logan-Cache Tutorial Center for the Instruction of Underachieving Readers and Writers. Logan, Utah: Logan City-Cache County School District, 1968) and a journal article (James P. Shaver and Dee Nuhn, "Underachievers in Reading and Writing Respond to a Tutoring Program." The Clearing House, Vol. 43, No. 4, December, 1968, pp. 236-239) might be of particular interest as background to this evaluation report.

differences because it provided a test of the significance of differences between mean scores on the reading and writing tests while controlling for any differences between the groups on the initial administration of the STEP tests and on the CTMM.

Table 1 presents mean scores on the CTMM for the pooled 1-to-1 and 1-to-3 tutorial groups and for the control groups. The mean score of the tenth grade tutored students on the CTMM was higher than that of the control students, at a level which would be expected to occur by chance fewer than five times out of a hundred. Interestingly, when the comparison was made with the tutored students broken into the 1-to-1 and 1-to-3 groups (Table 2), the difference among the means is not significant. There were no significant differences between means on the initial administration of the STEP reading and writing tests (Tables 3 and 4). Table 5 contains the intercorrelations for the CTMM and the STEP reading and writing scores, as well as for some other variables to be discussed shortly.

It was clear at the end of the first year of the tutorial program that tutoring had a statistically significant effect on the students and that the effect was increasingly greater from the fourth to the seventh to the tenth grades (see Table 6). The results of the analysis of data from the second year of tutoring (Table 7) make it evident that the effectiveness of tutoring indicated by the first year's data was not a chance finding. Although the differential effectiveness of tutoring at different grade levels also appeared in the second year's data, it was not as marked in terms of the number of students reaching potential or better (see Tables 12, 12a, 13, and 13a).

The Delayed Testing

It is of central interest for this report whether the gains of the tutorial students over the control students held up from one to two years after

participation in the tutoring program. To answer this question, the STEP reading and writing tests were readministered in the Spring of 1969 to the tutorial and control students who were in the program during the 1966-67 school year. In addition, the students' grades at the end of the 1967-68 school year and the end of the first semester of the 1968-69 school year (grades for the end of the 1968-69 school year were not available in time for the analysis) were obtained from the school records to determine if tutoring had an impact there.

The results of the analysis of the STEP test data from the delayed testing are presented in Table 8. Although, as one might expect, the magnitude of the F-ratios which test the significance of the differences among the means has decreased, the pattern is similar to that for the analysis of data at the conclusion of the first year of tutoring. However, the differences between the tutorial and control group means is no longer significant for the students tutored as fourth graders.

It is interesting to compare the means on the STEP tests from the Spring, 1966 testing (Table 3), the Spring, 1967 testing (Table 6), and the Spring, 1968 testing (Table 8). For those students tutored as seventh and tenth graders, there is little charge in mean scores from the end of their tutoring to two years later, with the differences at the end of tutoring sustained during the two-year period. However, both tutorial and control fourth grade students show considerable gain over the two-year period, with the control students ending up at about the same level of performance as the tutored ones. It is difficult to account for this difference in score changes over the two-year period. It may simply reflect the smaller advantage for tutorial versus control instruction at the fourth grade level. Or, it may be that natural

developmental changes in cognitive ability are more important following the fourth grade than for the other two grade levels, so that although special instruction gives the tutored fourth grader an initial boost, natural development catches the control student up over an extended period of time.

Grades

Although it was recognized that grades are not a particularly good measure of the effect of a single program on learning (there are too many other factors which enter into a grade), there had been some hope that tutoring students in reading and writing would have a positive impact on their other school work--and that this might be reflected in their grades. Tables 9, 10, and 11 present the results of analyzing the grades of tutorial versus control students at the end of the school year following tutoring and at the end of the first semester of the next school year. Again, covariance was used for the analysis in order to adjust statistically for any initial differences in CTMM scores.

No clear pattern appears to be present in the results for those tutored in the fourth grade. Control students had higher math grades on the average for some reason, but no explanation is readily available. The tutored students had better social studies grades on the average for the fifth grade year. This finding makes sense as social studies courses usually involve considerable reading and writing. However, the effect did not hold up for the first semester of the sixth grade school year.

As one might hope, having been tutored appeared to have a significant effect on English grades in both grading periods for students tutored as seventh or tenth graders. The scattered effects on science and social studies grades are difficult to interpret; some more consistent effect would have

better supported the idea that tutoring would improve performance in classes requiring considerable reading and/or writing. The significant differences on mean overall grade point average undoubtedly reflect the slight advantage that tutored students had in mean grades in each course, as well as the significant differences in mean English, science, and social studies grades.

Achievement of Potential

Comparisons of average performances on the STEP reading and writing tests and on grades provide valuable information as to the impact of tutoring. Such analyses do not, however, tell us how well the tutorial program succeeded in bringing students up to their predicted potentials in reading and writing, nor how well any differences in attaining potential, as compared to the control groups, held up over the two-year period. Consequently, counts were made to determine how many students were up to the predicted potential or better at the end of their tutoring experience and two years later. Frequencies of tutored and control students were analyzed using Chi-square to determine whether any differences were greater than would be expected on the basis of chance.

Tables 12 and 13 present the findings at the end of the period of tutoring. In every instance, there is a significant difference between the number of tutored and control students reaching potential, with each difference favoring the tutored students. As when the data were expressed in mean scores, there is an ascendingly greater effect from the fourth to the tenth grade. Nevertheless, the effectiveness of tutoring is clear.

Tables 14 and 15 present frequencies and Chi-squares for the Spring, 1969 testing, two years after completion of tutoring. The greater tendency for tutored students to be at their predicted potential or better is still evident

two years later, and at all three grade levels. Given the concern of the Tutorial Center with bringing students up to potential, it is encouraging to find that differences in this important regard were maintained two years after tutoring.

Summary

In summary, the effects of tutoring are still evident from one to two years following participation in the program. The effect is especially evident on the STEP reading and writing tests, both in terms of mean scores and frequencies of students who were at their predicted potential or better. Grades also showed differences favoring the tutored students. The results were not as clear cut with fourth graders as they were with seventh and tenth graders.

Comparing Tutorial Arrangements

To this point, the report has focused on comparisons of tutored and nontutored students. It will be recalled that some students were tutored in a 1-to-1 setting and others in a 1-to-3 setting. Because these two tutorial arrangements reflect considerable differences in the economics of tutoring, it is of interest to inquire whether one arrangement showed an advantage over the other.

A look back at Tables 2 and 4 indicates that there were no initial differences on the STEP reading and writing test scores and on CTMM scores when comparisons were made among the 1-to-1, 1-to-3, and control groups. Nevertheless, analyses of later mean scores were carried out using covariance to adjust for any slight differences that might be present.

The results of the analyses for mean scores of 1-1, 1-3, and control students on the STEP tests at the end of the first year of tutoring are

presented in Tables 16 and 17. The F-ratios for the three groups reflect the findings comparing tutorial and control reported earlier. In each case where the F-ratio for all three means was significant, the 1-to-1 and 1-to-3 group means were compared using Scheffe's method to determine if the differences between the two means was significant. As one would expect, looking at the means in Tables 16 and 17, none of the 1-to-1 versus 1-to-3 comparisons yielded a significant difference.

Tables 18 and 19 contain the results of 1-to-1 versus 1-to-3 versus control comparisons on the STEP tests administered in the Spring of 1969, two years after tutoring. The results are similar to those in Tables 16 and 17; no 1-to-1 and 1-to-3 means were significantly different.

The results of comparing 1-to-1, 1-to-3, and control group mean grades are presented in Tables 20 through 25. There is little of additional interest in those tables, even though in one instance (tenth grade, English, end of the 1967-68 school year--Table 22) there was a significant difference between students in the 1-to-1 and 1-to-3 tutoring groups. The small Ns for some of the seventh and tenth grade comparisons should be noted.

It was also of interest to ask whether 1-to-1 and 1-to-3 tutoring had differential effects on the number of students reaching predicted potential at the end of the tutoring period and remaining there two years later. The data in Tables 26 and 27 indicate clearly that there were no systematic differences between the two tutoring arrangements in this regard at the end of the tutoring period. And, as would be expected, no differences emerged two years later (Tables 28 and 29).

Summary

In short, the results indicate no systematic differences favoring either 1-to-1 or 1-to-3 tutoring. This finding is of importance primarily in terms

of the economics of tutoring, which is a relatively expensive process. If three times as many students can be handled, then costs are reduced considerably. And, it may be that if 1-to-3 tutoring is as effective as 1-to-1 tutoring, higher tutor-pupil ratios might also be equally effective. Of course, it must be remembered that any conclusions based on this report must be restricted by the measures used. The tutors in the Logan-Cache Center would, without exception, maintain that they perceived valued changes in students going beyond what can be measured by achievement tests and grades. Programs which have objectives going beyond those measured by the STEP reading and writing tests and by grade point averages may not be willing to concede that the smaller tutor-sppil ratios are not more effective for some types of human relations tutoring.

One-to-five Tutoring

From the data available for the first two years of the tutorial program, it seemed clear that tutoring had a significant impact upon the tutored students, and that 1-to-1 and 1-to-3 tutoring had an equal impact on test performance. Consequently, it was decided that during the third year of operation it would not be necessary to maintain a control group against which to compare tutored students, and that a higher tutor-pupil ratio should be tried out. Students were tutored in 1-to-1, 1-to-3, and 1-to-5 arrangements.

As in the previous years, the California Test of Mental Maturity (CTMM) was used as a criterion of scholastic potential, and the correlation between CTMM and STEP reading and writing scores was used to predict reading and writing potential. Those students with the greatest discrepancies between the predicted and obtained STEP scores were selected for tutoring and assigned randomly to a 1-to-1, 1-to-3, or 1-to-5 arrangement. Another form of the STEP

reading and writing tests was again administered in the spring of the school year to check on the relative effectiveness of the three arrangements. Analysis of covariance was used again to allow the comparison of posttest means adjusted for any initial group differences in CTMM or STEP scores.

The results of comparing the mean reading and writing scores at the end of the school year are presented in Tables 30 and 31. None of the differences among means is statistically significant, reflecting what seems obvious from an inspection of the tables.

The frequencies of students reaching potential or better for the three arrangements were also compared. Tables 32 and 33 indicate that no one arrangement was more effective than the others. In fact, all three arrangements show a consistent and marked tendency to bring nearly all students up to their predicted potential or better.

A look at the Ns reported in Tables 30 and 31 indicates one weakness in the research design for this part of the evaluation--that is, the relatively fewer students in 1-5 tutoring. This means that only two or three tutors used this arrangement at each grade level, so that it is difficult to be certain that the effect of the tutoring ratio was not confounded with the effectiveness of the particular tutors using the arrangement. This confounding is, of course, controlled for when a greater number of teachers use an educational method. However, as long as no one arrangement showed greater effectiveness than the others, this shortcoming in design seems to be of less importance than if a statistically significant effect had emerged.

The results do suggest that tutors can work with at least five students as effectively as one or three, as judged by performance on the STEP tests. It should be kept in mind, however, that this conclusion is restricted by the measures used. Other tutorial projects may have other objectives that would

require the smaller tutor-pupil ratios. Also, although initial assignments to the tutorial arrangement were random, the project director and the tutors did make some shifts of assignment when it appeared that a student would respond better in one of the other arrangements. So, any conclusions must also be made in terms of a program in which some assignments were made on the basis of judgments about the student's reaction to varying group sizes.

Conclusion

The testing arrangements of the Tutorial Center allowed a unique opportunity to assess the impact of an educational program, with both immediate and delayed posttests. The findings indicate that tutoring had a positive effect on mean STEP reading and writing test scores and on the number of students coming up to potential or better. These results were clearest at the end of the tutoring period and two years later, especially with students tutored as seventh and tenth graders. The effect of tutoring on grades was not so clear, even though there were some encouraging findings. Comparisons of 1-to-1 and 1-to-3 tutoring ratios yielded no differences either at the end of the tutoring period or two years later. And, a comparison of 1-to-1, 1-to-3, and 1-to-5 tutoring ratios in the third year of the Center's program indicated no differences in mean STEP reading and writing scores or in the number of students' reading potential or better.

It seems evident that tutoring had a positive impact which was both statistically and educationally significant, and that tutoring in reading and writing can take place effectively in more economical arrangements than the traditional one-to-one tutor-student ratio. However, educators are still faced with a difficult question of resource allocation: Are the gains from tutoring worth the additional costs beyond classroom instruction? Questions in regard

to the effects of tutor-student ratios larger than 1-to-5 have also not been adequately resolved. In addition, the staff of the Tutorial Center believes another question needs to be explored: That is, to what extent can the techniques of tutoring developed by the Center be applied more economically in the classroom setting using tutors as teacher aides?

TABLE 1

Mean Raw Scores on the California Test of Mental Maturity
Tutorial Versus Control Groups, in Spring, 1966

Grade	Tutorial	N	Control	N	F
4th	70.7	46	73.5	20	1.3
7th	82.1	46	82.7	18	.02
10th	91.1	44	83.6	20	5.5*

* Significant beyond the .05 level.

TABLE 2

Mean Raw Scores on the California Test of Mental Maturity,
1-1 Versus 1-3 Versus Control Groups, Spring 1966

Grade	1-1	N	1-3	N	Control	N	F*
4th	71.2	22	70.3	24	73.5	20	.72
7th	80.8	22	33.4	24	82.7	18	.18
10th	90.9	21	91.3	23	83.6	20	2.7

* None is significant at the .05 level.

TABLE 3

Mean Scores on the STEP Tests, Tutorial
Versus Control Groups, Spring 1966

Grade	Reading					Writing				
	Tutorial	N	Control	N	F*	Tutorial	N	Control	N	F*
4th	28.5	40	29.8	19	.21	16.9	46	17.6	20	.00
7th	34.2	45	34.0	17	.00	24.2	46	23.1	18	.33
10th	36.1	43	34.0	20	.68	27.2	44	24.4	20	2.6

* None is significant at the .05 level.

TABLE 4

Mean Scores on the STEP Tests, 1-1 Versus 1-3
Versus Control Groups, Spring 1966

Grade	Reading							Writing						
	1-1	N	1-3	N	Control	N	F*	1-1	N	1-3	N	Control	N	F*
4th	26.7	18	26.6	23	23.1	14	1.2	18.2	22	15.7	24	17.6	24	1.3
7th	32.0	22	36.3	23	34.0	17	.96	24.3	22	24.2	24	23.1	18	.16
10th	36.9	21	35.3	22	34.0	20	.52	28.2	21	26.3	23	24.4	20	1.7

* None is significant at the .05 level.

TABLE 5

Correlations Between California Test of Mental Maturity Raw Scores and Scores on Other Selected Variables

Variables	Correlation Coefficient 4th	7th	10th
CTMM & STEP Reading, Spring 1969	.64	.68	.60
CTMM & STEP Writing, Spring 1969	.75	.55	.58
CTMM & English Grade, 1968	.45	.50	.29
CTMM & English Grade, 1st Semester, 1968-69	.50	.45	.29
CTMM and Overall GPA, 1968	.53	.57	.20
CTMM & Overall GPA 1st Semester, 1968-69	.48	.47	.38

TABLE 6

Summary of Analyses of Covariance Comparing Mean Scores of Tutorial and Control Students at the End of the 1966-67 School Year, Controlling for Scholastic Aptitude as Measured by the California Test of Mental Maturity and Spring 1966 Scores on the STEP Tests

	Reading					Writing				
	Tutorial		Control			Tutorial		Control		
Grade	Adjusted Mean	N	Adjusted Mean	N	F	Adjusted Mean	N	Adjusted Mean	N	F
4th	40.0	41	36.0	20	4.4*	28.8	46	24.8	20	6.1*
7th	48.3	45	40.2	17	25.4**	36.4	46	29.0	18	36.9**
10th	50.5	43	41.8	20	47.3**	36.4	44	29.2	20	40.9**

* Significant beyond the .05 level.

** Significant beyond the .001 level.

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TABLE 7

Summary of Analyses of Covariance Comparing Mean Scores of Tutorial and Control Students at the End of the 1967-68 School Year, Controlling for Scholastic Aptitude as Measured by the California Test of Mental Maturity and Spring 1967 Scores on the STEP Tests.

	Reading					Writing				
Grade	Tutorial Adjusted Mean	N	Control Adjusted Mean	N	F	Tutorial Adjusted Mean	N	Control Adjusted Mean	N	F
4th	47.9	46	39.5	21	9.9**	33.5	46	28.9	21	5.3*
7th	50.1	45	36.9	21	33.8***	37.6	45	26.3	21	26.1***
10th	51.8	44	42.4	21	49.7***	38.4	44	28.9	21	44.6***

* Significant beyond the .05 level.

** Significant beyond the .01 level.

*** Significant beyond the .001 level.

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TABLE 8

Summary of Analyses of Covariance Comparing Mean Scores of Tutorial and Control Students at the End of the 1968-69 School Year, Controlling for Scholastic Aptitude as Measured by the California Test of Mental Maturity and Spring 1966 Scores on the STEP Tests

	Reading					Writing				
Grade	Tutorial Adjusted Mean	N	Control Adjusted Mean	N	F	Tutorial Adjusted Mean	N	Control Adjusted Mean	N	F
4th	47.5	40	45.8	20	.51	33.2	40	33.3	20	.00
7th	47.9	27	41.0	15	12.2*	38.7	30	30.9	16	14.5**
10th	50.2	41	42.2	19	15.4**	38.0	42	31.7	19	14.8**

* Significant beyond the .01 level.

** Significant beyond the .001 level.

TABLE 9

Summary of Analysis of Covariance for Grades of 4th Grade Tutorial & Control Students, Controlling for California Test of Mental Maturity Scores

Subject	End of 1967-68 School Year Tutorial Adjusted Mean	N	Control Adjusted Mean	N	F	End of 1st Semester, 1968-69 Tutorial Adjusted Mean	N	Control Adjusted Mean	N	F
English	3.6	39	3.3	20	3.2	3.4	40	3.2	20	2.0
Math	3.2	39	3.8	20	8.2**	3.2	40	3.5	20	4.1*
Science	3.4	39	3.4	20	.06	3.2	40	3.5	20	5.2*
Social Studies	3.4	39	2.9	20	4.6*	3.0	40	3.1	20	.22
Overall GPA	3.5	39	3.2	20	2.4	3.3	40	3.3	20	.00

* Significant beyond the .05 level.

** Significant beyond the .01 level.

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TABLE 10

Summary of Analysis of Covariance for Grades
of 7th Grade Tutorial & Control Students,
Controlling for California Test of
Mental Maturity Scores

Subject	End of 1967-68 School Year					End of 1st Semester, 1968-69				
	Tutorial Adjusted Mean	N	Control Adjusted Mean	N	F	Tutorial Adjusted Mean	N	Control Adjusted Mean	N	F
English	3.6	30	2.6	16	25.6***	3.7	30	3.0	16	11.0**
Math	3.1	30	2.8	16	2.1	3.3	14	2.9	9	1.7
Science	3.1	28	2.9	16	.45	3.0	20	2.4	12	4.2*
Social Studies	3.3	30	3.1	16	.88	3.3	29	2.9	16	2.2
Overall GPA	3.4	30	3.0	16	5.1*	3.4	30	2.9	16	7.4**

* Significant beyond the .05 level.

** Significant beyond the .01 level.

*** Significant beyond the .001 level.

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TABLE 11

Summary of Analysis of Covariance for Grades
of 10th Grade Tutorial & Control Students,
Controlling for California Test of
Mental Maturity Scores

Subject	End of 1967-68 School Year					End of 1st Semester, 1968-69				
	Tutorial Adjusted Mean	N	Control Adjusted Mean	N	F	Tutorial Adjusted Mean	N	Control Adjusted Mean	N	F
English	3.7	41	2.8	19	21.8***	1/56	3.8	41	2.9	18	18.6***
Math	3.1	27	2.7	10	1.6	1/16	3.8	17	3.3	2	.80
Science	3.2	39	2.7	16	5.5*	1/43	3.5	30	2.9	16	6.9*
Social Studies	3.4	39	2.9	19	4.6*	1/54	3.6	39	3.3	18	1.8
Overall GPA	3.4	41	2.9	19	5.7*	1/57	3.7	41	3.0	18	10.9**

* Significant beyond the .05 level.

** Significant beyond the .01 level.

*** Significant beyond the .001 level.

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TABLE 12

Frequencies of Tutored and Control Students up to or Better than Potential or Below Potential on the STEP Reading Test, Spring 1967

	4th Grade			7th Grade			10th Grade		
	Tutored	Control	Total	Tutored	Control	Total	Tutored	Control	Total
Potential or Better	34	4	38	40	6	46	44	6	50
Below Potential	7	10	17	4	13	17	0	13	13
Total	41	14	55	44	19	63	44	19	63
Chi Square	12.0*				20.8*			33.9*	

* Significant beyond the .001 level.

00023

TABLE 12a

Frequencies of Tutored and Control Students up to or Better than Potential or Below Potential on the STEP Reading Test, Spring 1968

	4th Grade			7th Grade			10th Grade		
	Tutored	Control	Total	Tutored	Control	Total	Tutored	Control	Total
Potential or Better	45	6	51	42	5	47	44	6	50
Below Potential	1	12	13	3	16	19	0	15	15
Total	46	18	64	45	21	66	44	21	65
Chi Square		29.4*			30.4*			36.9*	

* Significant beyond the .001 level.

TABLE 13

Frequencies of Tutored and Control Students up to or Better than Potential or Below Potential on the STEP Writing Test, Spring 1967

	4th Grade			7th Grade			10th Grade		
	Tutored	Control	Total	Tutored	Control	Total	Tutored	Control	Total
Potential or Better	41	9	50	44	6	50	45	4	49
Below Potential	5	11	16	2	14	16	0	15	15
Total	46	20	66	46	20	66	45	19	64
Chi Square		12.5*			29.2*			42.1*	

* Significant beyond the .001 level.

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TABLE 13a

Frequencies of Tutored and Control Students up to
or Better than Potential or Below Potential
on the STEP Writing Test, Spring 1968

	4th Grade			7th Grade			10th Grade		
	Tutored	Control	Total	Tutored	Control	Total	Tutored	Control	Total
Potential or Better	43	8	51	44	4	48	44	8	52
Below Potential	2	12	14	1	15	16	0	13	13
Total	45	20	65	45	19	64	44	21	65
Chi Square		22.1*			37.9*			30.3*	

* Significant beyond the .001 level.

00025

TABLE 14

Frequencies of Tutored and Control Students up to or Better than Potential or Below Potential on the STEP Reading Test, Spring 1969

	4th Grade			7th Grade			10th Grade		
	Tutored	Control	Total	Tutored	Control	Total	Tutored	Control	Total
Potential or Better	39	10	49	26	6	32	40	7	47
Below Potential	3	8	11	1	9	10	1	12	13
Total	42	18	60	27	15	42	41	19	60
Chi Square		9.3*			13.9*			24.7*	

* Significant beyond the .01 level.

** Significant beyond the .001 level.

00026

TABLE 15

Frequencies of Tutored and Control Students up to or Better than Potential or Below Potential on the STEP Writing Test, Spring 1969

	4th Grade			7th Grade			10th Grade		
	Tutored	Control	Total	Tutored	Control	Total	Tutored	Control	Total
Potential or Better	39	14	53	30	5	35	42	7	49
Below Potential	3	6	9	0	11	11	0	12	12
Total	42	20	62	30	16	46	42	19	61
Chi Square		4.0*			4.0*			29.1**	

* Significant beyond the .05 level.

** Significant beyond the .001 level.

220027

TABLE 16

Summary of Analyses of Covariance Comparing Mean Scores of 1-1, 1-3, and Control Students on the STEP Reading Test at the End of the 1966-67 School Year, Controlling for Scholastic Ability as Measured by the California Test of Mental Maturity and Spring 1966 Scores on the STEP Test

Grade	1-1 Adjusted Mean	N	1-3 Adjusted Mean	N	Control Adjusted Mean	N	F
4th	40.9	18	39.3	23	36.0	14	2.5
7th	47.1	22	49.6	23	40.2	17	14.0*
10th**	52.6	21	48.4	22	41.8	20	33.0*

* Significant beyond the .001 level.

** Difference between 1-1 and 1-3 means significant at the .05 level.

TABLE 17

Summary of Analyses of Covariance Comparing Mean Scores of 1-1, 1-3, and Control Students on the STEP Writing Test at the End of the 1966-67 School Year, Controlling for Scholastic Ability as Measured by the California Test of Mental Maturity and Spring 1966 Scores on the STEP Test

Grade	1-1 Adjusted Mean	N	1-3 Adjusted Mean	N	Control Adjusted Mean	N	F
4th	29.8	22	27.8	24	24.8	20	3.7*
7th	35.9	22	36.9	24	29.0	18	18.6**
10th	37.4	21	35.6	23	29.2	20	22.0**

* Significant beyond the .05 level.

** Significant beyond the .001 level.

TABLE 18

Summary of Analyses of Covariance Comparing Mean Scores of 1-1, 1-3, and Control Students on the STEP Reading Test at the End of the 1968-69 School Year, Controlling for Scholastic Ability as Measured by the California Test of Mental Maturity and Spring 1966 Scores on the STEP Test

Grade	1-1 Adjusted Mean	N	1-3 Adjusted Mean	N	Control Adjusted Mean	N	F
4th	46.6	20	48.5	20	45.8	20	.50
7th	46.5	14	49.4	13	40.9	15	6.9*
10th	49.7	20	50.6	21	42.2	19	7.7*

* Significant beyond the .01 level.

TABLE 19

Summary of Analyses of Covariance Comparing Mean Scores of 1-1, 1-3, and Control Students on the STEP Writing Test at the End of the 1968-69 School Year, Controlling for Scholastic Ability as Measured by the California Test of Mental Maturity and Spring 1966 Scores on the STEP Test

Grade	1-1 Adjusted Mean	N	1-3 Adjusted Mean	N	Control Adjusted Mean	N	F
4th	33.3	20	33.2	20	33.3	20	.00
7th	37.2	16	40.5	14	30.9	16	8.4**
10th	38.3	20	37.8	22	31.7	19	7.3*

* Significant beyond the .01 level.

** Significant beyond the .001 level.

TABLE 20

Summary of Analyses of Covariance for Grades of 4th Grade Students at the End of the 1967-68 School Year, 1-1 Versus 1-3 Versus Control, Adjusted for Spring 1966 California Test of Mental Maturity Scores

Subject	1-1 Adjusted Mean	N	1-3 Adjusted Mean	N	Control Adjusted Mean	N	F
English	3.6	20	3.6	19	3.3	20	1.6
Math	3.3	20	3.1	19	3.8	20	4.5*
Science	3.3	20	3.5	19	3.4	20	.25
Social Studies	3.3	20	3.0	19	3.4	20	1.6
Overall GPA	3.4	20	3.5	19	3.2	20	1.5

* Significant beyond the .05 level.

TABLE 21

Summary of Analyses of Covariance for Grades of 7th Grade Students at the End of the 1967-68 School Year, 1-1 Versus 1-3 Versus Control, Adjusted for Spring 1966 California Test of Mental Maturity Scores

Subject	1-1 Adjusted Mean	N	1-3 Adjusted Mean	N	Control Adjusted Mean	N	F
English	3.5	16	3.7	14	2.6	16	13.1**
Math	3.2	16	3.0	14	2.8	16	1.2
Science	3.1	14	3.0	14	2.9	16	.24
Social Studies	3.2	16	3.4	14	3.1	16	.63
Overall GPA	3.3	16	3.6	14	3.0	16	3.7*

* Significant beyond the .05 level.

** Significant beyond the .001 level.

00030

TABLE 22

Summary of Analyses of Covariance for Grades of 10th Grade Students at the End of the 1967-68 School Year, 1-1 Versus 1-3 Versus Control, Adjusted for Spring 1966 California Test of Mental Maturity Scores

Subject	1-1 Adjusted Mean	N	1-3 Adjusted Mean	N	Control Adjusted Mean	N	F
English***	4.0	19	3.5	22	2.9	19	17.1**
Math	3.5	13	2.8	14	2.7	10	3.8*
Science	3.4	18	3.1	21	2.7	16	3.9*
Social Studies	3.6	17	3.2	22	2.9	19	4.1*
Overall GPA	3.6	19	3.2	22	2.9	19	4.9*

* Significant beyond the .05 level.

** Significant beyond the .001 level.

*** Difference between 1-1 and 1-3 means is significant at the .05 level.

TABLE 23

Summary of Analyses of Covariance for Grades of 4th Grade Students at the End of the 1st Semester of the 1968-69 School Year, 1-1 Versus 1-3 Versus Control, Adjusted for Spring 1966 California Test of Mental Maturity Scores

Subject	1-1 Adjusted Mean	N	1-3 Adjusted Mean	N	Control Adjusted Mean	N	F
English	3.4	20	3.4	20	3.2	20	.99
Math	3.1	20	3.1	20	3.5	20	2.1
Science	3.3	20	3.1	20	3.5	20	3.2*
Social Studies	3.1	20	2.9	20	3.1	20	.72
Overall GPA	3.3	20	3.2	20	3.3	20	.25

* Significant beyond the .05 level.

TABLE 24

Summary of Analyses of Covariance for Grades of 7th Grade Students at the End of the 1st Semester of the 1968-69 School Year, 1-1 Versus 1-3 Versus Control, Adjusted for Spring 1966 California Test of Mental Maturity Scores

Subject	1-1 Adjusted Mean	N	1-3 Adjusted Mean	N	Control Adjusted Mean	N	F
English	3.7	16	3.7	14	3.0	16	5.4**
Math	3.3	6	3.3	8	2.9	9	.80
Science	2.8	9	3.1	11	2.4	12	2.7
Social Studies	3.3	16	3.3	13	2.9	16	1.1
Overall GPA	3.5	16	3.4	14	2.9	16	3.6*

* Significant beyond the .05 level.

** Significant beyond the .01 level.

TABLE 25

Summary of Analyses of Covariance for Grades of 10th Grade Students at the End of the 1st Semester of the 1968-69 School Year, 1-1 Versus 1-3 Versus Control, Adjusted for Spring 1966 California Test of Mental Maturity Scores

Subject	1-1 Adjusted Mean	N	1-3 Adjusted Mean	N	Control Adjusted Mean	N	F
English	3.9	19	3.7	22	2.9	18	9.9***
Math	3.9	8	3.8	9	3.3	2	.46
Science	3.7	15	3.2	15	2.9	16	6.0**
Social Studies	3.7	17	3.5	22	3.3	18	1.0
Overall GPA	3.7	19	3.6	22	3.0	18	5.7*

* Significant beyond the .05 level.

** Significant beyond the .01 level.

*** Significant beyond the .001 level.

00032

TABLE 26

Frequencies of 1-1 and 1-3 Tutored Students up to or Better Than Potential or Below Potential on the STEP Reading Test, Spring 1967

	4th Grade			7th Grade			10th Grade		
	1-1	1-3	Total	1-1	1-3	Total	1-1	1-3	Total
Potential or Better	15	19	34	18	22	40	22	22	44
Below Potential	3	4	7	3	1	4	0	0	0
Total	18	23	41	21	23	44	22	22	44
Chi Square		------*			-------*			------*	

* Chi-square less than one, or obviously not significant.

TABLE 27

Frequencies of 1-1 and 1-3 Tutored Students up to or Better than Potential or Below Potential on the STEP Writing Test, Spring 1967

	4th Grade			7th Grade			10th Grade		
	1-1	1-3	Total	1-1	1-3	Total	1-1	1-3	Total
Potential or Better	22	19	41	21	23	44	22	23	45
Below Potential	0	5	5	1	1	2	0	0	0
Total	22	24	46	22	24	26	22	23	45
Chi Square		3.22*			------**			------**	

* With 1 degree of freedom, Chi Square must be 3.84 to be significant at the .05 level.

** Chi-square less than one, or obviously not significant.

TABLE 28

Frequencies of 1-1 and 1-3 Tutored Students up to or Better Than Potential or Below Potential on the STEP Reading Test, Spring 1969

	4th Grade			7th Grade			10th Grade		
	1-1	1-3	Total	1-1	1-3	Total	1-1	1-3	Total
Potential or Better	18	21	39	13	13	26	19	21	40
Below Potential	2	1	3	1	0	1	1	0	1
Total	20	22	42	14	13	27	20	21	41
Chi Square	------*			------*			------*		

* Chi-square less than one, or obviously not significant by inspection.

TABLE 29

Frequencies of 1-1 and 1-3 Tutored Students up to or Better than Potential or Below Potential on the STEP Writing Test, Spring 1969

	4th Grade			7th Grade			10th Grade		
	1-1	1-3	Total	1-1	1-3	Total	1-1	1-3	Total
Potential or Better	19	20	39	16	14	30	20	22	42
Below Potential	1	2	3	0	0	0	0	0	0
Total	20	22	42	16	14	30	20	22	42
Chi Square	------*			------*			------*		

* Chi-square less than one, or obviously not significant by inspection.

TABLE 30

Summary of Analyses of Covariance Comparing Mean Scores of 1-1, 1-3, and 1-5 Students on the STEP Reading Test at the End of the 1968-69 School Year, Controlling for Scholastic Ability as Measured by the California Test of Mental Maturity and Spring 1968 Scores on the STEP Test

Grade	1-1 Adjusted Mean	N	1-3 Adjusted Mean	N	1-5 Adjusted Mean	N	F*
4th	45.0	15	46.7	18	49.4	14	.48
7th	51.0	16	52.2	17	53.1	10	.57
10th	53.3	8	54.6	23	52.9	10	.71

* None is significant at the .05 level.

TABLE 31

Summary of Analyses of Covariance Comparing Mean Scores of 1-1, 1-3, and 1-5 Students on the STEP Writing Test at the End of the 1968-69 School Year, Controlling for Scholastic Ability as Measured by the California Test of Mental Maturity and Spring 1968 Scores on the STEP Test

Grade	1-1 Adjusted Mean	N	1-3 Adjusted Mean	N	1-5 Adjusted Mean	N	F*
4th	34.5	15	35.0	18	35.3	14	.02
7th	38.8	16	40.2	17	38.6	10	.44
10th	35.0	8	38.1	23	36.6	10	1.1

* None is significant at the .05 level.

TABLE 32

Frequencies of 1-1, 1-3, and 1-5 Students up to Potential or Better than Potential or Below Potential on the STEP Reading Test, Spring 1969

	4th Grade				7th Grade				10th Grade			
	1-1	1-3	1-5	Total	1-1	1-3	1-5	Total	1-1	1-3	1-5	Total
Potential or Better	13	16	14	43	15	18	10	43	8	23	10	41
Below Potential	1	1	1	3	1	0	0	1	0	0	0	0
Total	14	17	15	46	16	18	10	44	8	23	10	41
Chi Square		------*				------*				------*		

* Chi-square obviously not significant by inspection.

TABLE 33

Frequencies of 1-1, 1-3, and 1-5 Students up to Potential or Better than Potential or Below Potential on the STEP Writing Test, Spring 1969

	4th Grade				7th Grade				10th Grade			
	1-1	1-3	1-5	Total	1-1	1-3	1-5	Total	1-1	1-3	1-5	Total
Potential or Better	13	16	14	43	14	18	10	42	7	22	10	39
Below Potential	1	1	1	3	1	0	0	1	0	1	0	1
Total	14	17	15	46	15	18	10	43	7	23	10	40
Chi Square		------*				------*				------*		

* Chi-square obviously not significant by inspection.